

WHAT IS CLAIMED IS:

1. An exposure apparatus, comprising:  
a projection optical system of catadioptric  
type; and

5 an optical element disposed on a  
reciprocating light path of said projection optical  
system, said optical element being movable to adjust a  
symmetrical aberration of said projection optical  
system.

10 2. An exposure apparatus, comprising:  
a projection optical system of catadioptric  
type; and

15 an optical element disposed on a  
reciprocating light path of said projection optical  
system, said optical element being movable to correct  
at least one of spherical aberration, astigmatism, and  
curvature of field.

20 3. An apparatus according to Claim 1 or 2,  
wherein at least one of spherical aberration,  
astigmatism and curvature of field, produced with a  
heat, a pressure or an illumination condition, is  
corrected.

25 4. An apparatus according to Claim 1 or 2,  
wherein light projected on said optical element is

reflected by a mirror, disposed at an aperture stop position or a position equivalent thereto, and is directed again to said optical element.

5           5.    An apparatus according to Claim 4, wherein said mirror comprises a concave mirror.

          6.    An apparatus according to Claim 4, wherein said optical element is disposed adjacent to said  
10   mirror.

          7.    An apparatus according to Claim 1 or 2, wherein an ArF laser is used as an exposure light source.

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          8.    An apparatus according to Claim 1 or 2, wherein an F<sub>2</sub> laser is used as an exposure light source.

20           9.    An apparatus according to Claim 1 or 2, wherein comma aberration and distortion aberration as asymmetrical aberrations of said projection optical system are adjusted by motion of an optical element disposed on a single way of the light path.

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          10.   A device manufacturing method, comprising the steps of:

exposing a wafer to a device pattern by use  
of an exposure apparatus as recited in any one of  
Claims 1 - 9; and  
developing the exposed wafer.

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